

FACTS ABOUT FERTILIZERS

To survive, plants need:

- Light, water, carbon dioxide
- Suitable temperature
- Energy
 - They convert sunlight and CO_2 to glucose
- Minerals
 - Unlike food, they do NOT supply energy
 - Needed to grow and thrive
 - Absorb minerals from soil through roots
 - Root hairs increase surface area

Macro and Micronutrients

- Plants need 13 different minerals
- 3 Macronutrients
 - Needed in greater quantities
 - Nitrogen
 - Promotes growth of healthy leaves



– Phosphorus

- Promotes strong, healthy roots
- Helps flowers bloom



– Potassium

- Helps plants withstand dramatic temperature changes
- Protects them from disease



- 10 *Micronutrients*
 - Needed in very small amounts
 - Includes calcium, magnesium, sulfur, iron

Note: It is not good to have too much fertilizer either! It can be poisonous!

TROPISMS

Phototropism =

- The way a plant grows or bends in response to light

Hydrotropism =

- The way a plant grows or bends in response to water

Thigmotropism =

- The way a plant grows or bends in response to touch

Geotropism =

- The way a plant grows or bends in response to gravity

Tropisms can be positive or negative

- Positive
 - Plant moves toward stimulus
- Negative
 - Plant moves away from stimulus

From Seeds to Plants...and Back!

General Life Cycle of Plants

- Germination =
 - Process by which a seed becomes a plant
- 1. Seed goes through a dormant stage
 - Inactive stage of the seed
 - Protected by tough seed coat
 - Allows seed to withstand extreme temperatures
 - Embryo is surrounded by endosperm
 - Important food-storing tissue
 - Nourishes developing embryo

- Contains seed leaves called cotyledons

- Monocotyledon

- Monocots

- Contain one cotyledon

- » Never emerges from soil

- Examples:

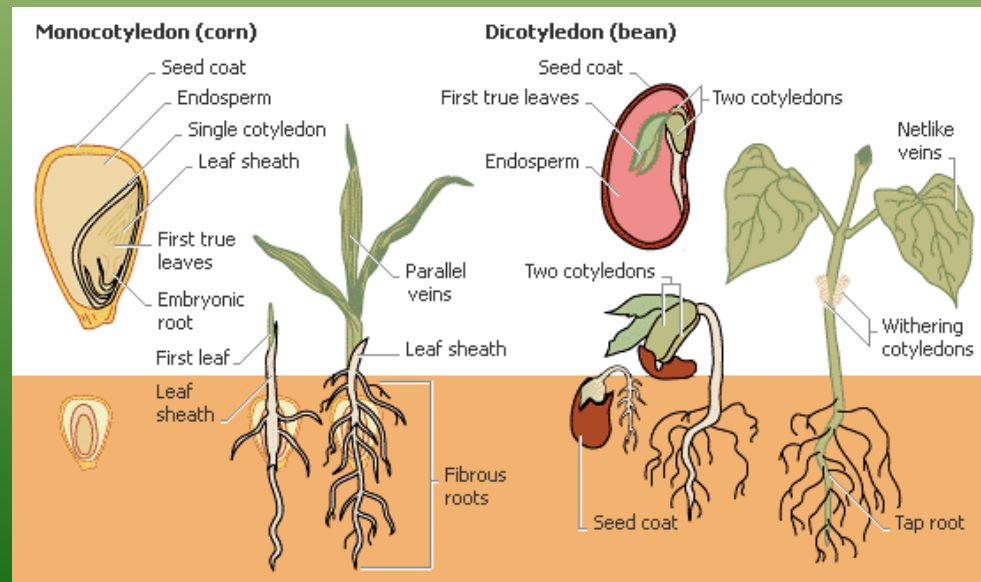
- » Cereal grains

- » Wheat

- » Rice

- » Corn

- Dicotyledon
 - Dicots
 - Contain two cotyledons
 - » Emerge from soil with stem and continue to provide energy
 - Example:
 - » Beans



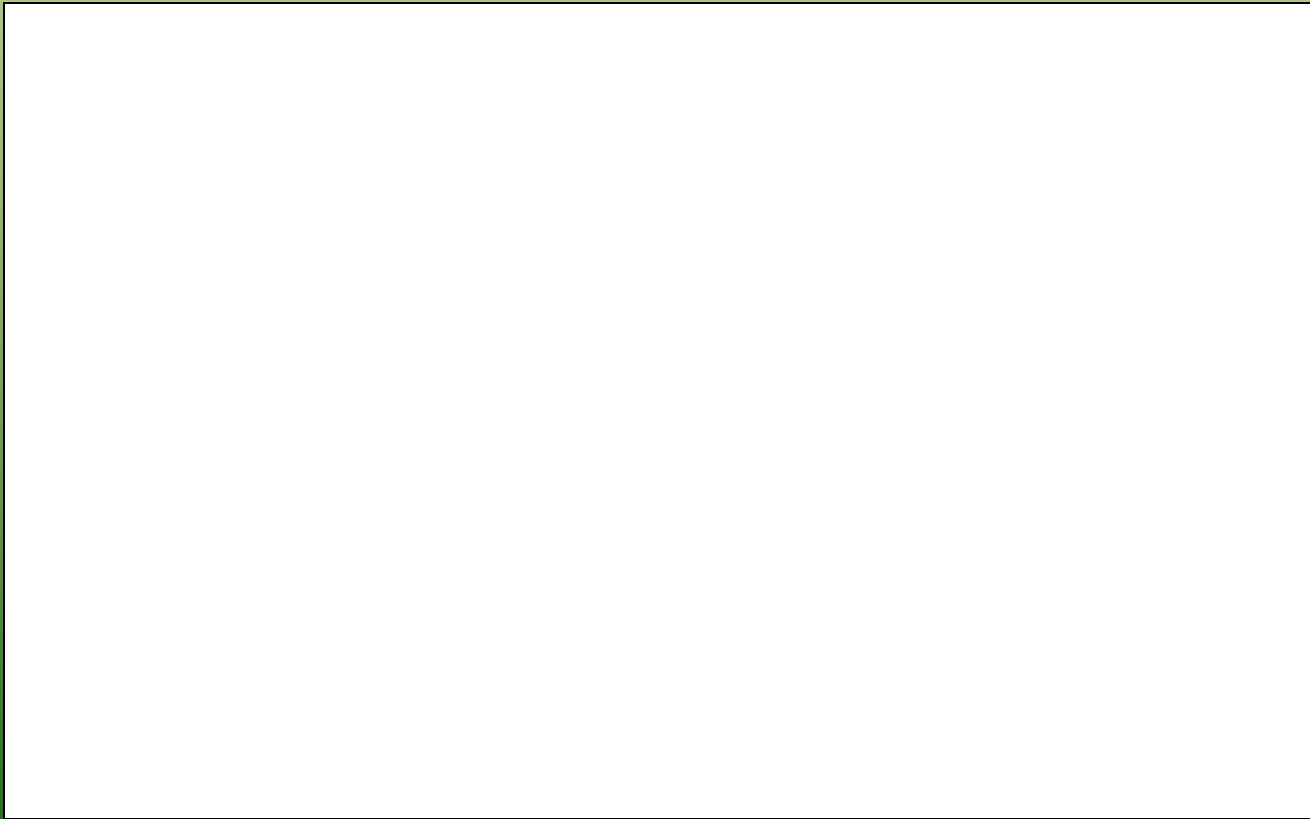
2. Primary root emerges from seed

- Grows downward
- Forms anchor for developing plant
- Roots absorb water and nutrients

3. Cotyledons poke through soil

4. Leaves expand as they sense light

Draw the 3 stages in the development of a young bean plant from page 61.



5. More leaves develop and root system matures

6. Plant can manufacture its own food during photosynthesis

- Light + water + carbon dioxide → glucose + oxygen
- $\text{Light} + 6 \text{H}_2\text{O} + 6 \text{CO}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2$

7. Plant matures and flowers

- Pollination
- Fertilization

8. Flowers wither and fruit develops

– Fruit

- Provides protective covering
- Supports development of seeds
- Aids in seed dispersal

9. Seeds germinate and grow

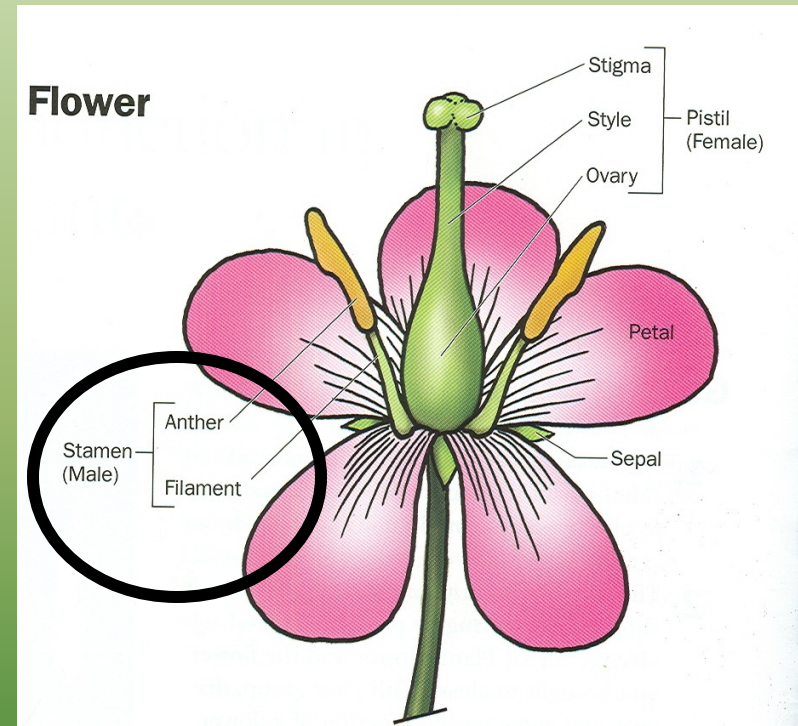
– Life cycle begins again

Structure of Flowering Plants

MALE

Stamen

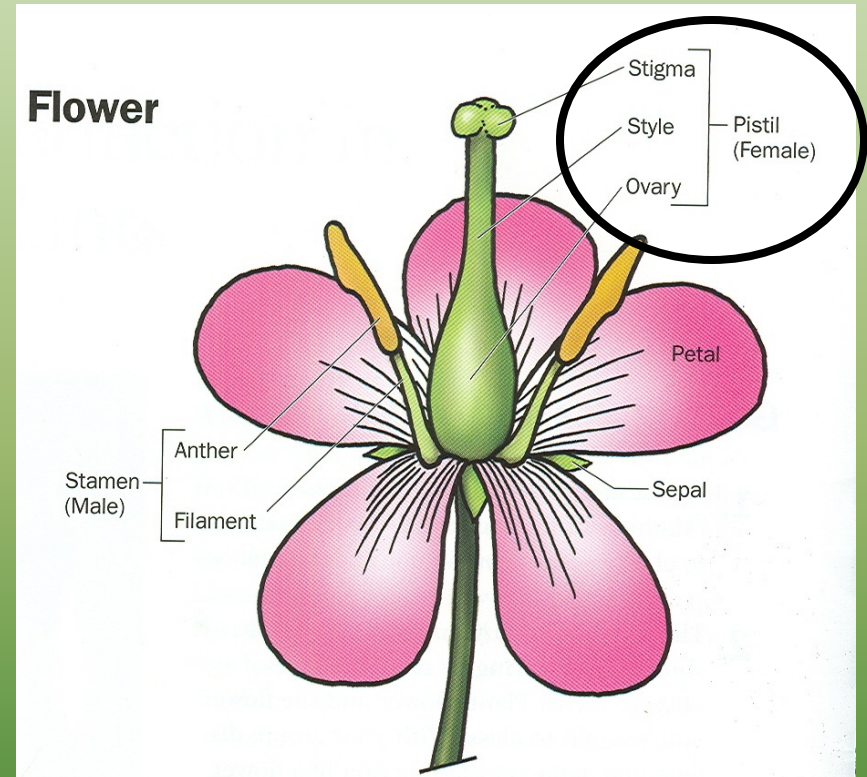
- Anther
 - Produces pollen
 - Contains sperm nuclei
- Filament
 - Supports anther



FEMALE

Pistil

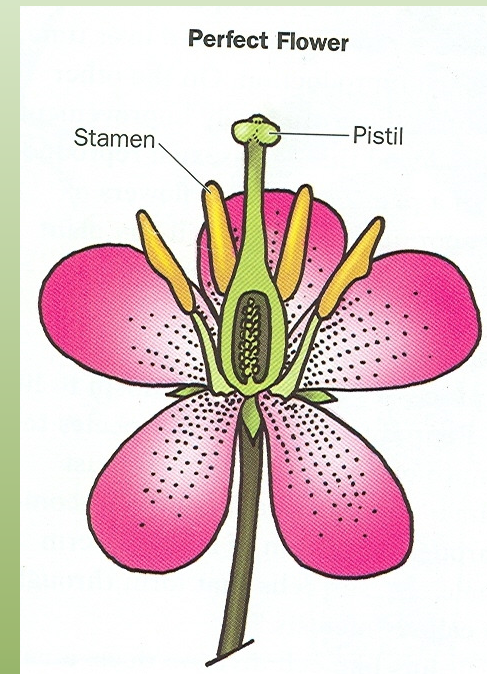
- Stigma
 - Sticky
- Style
 - Supports stigma
- Ovary
 - Produces ovules
 - Contain egg nuclei



Reproduction of Flowering Plants

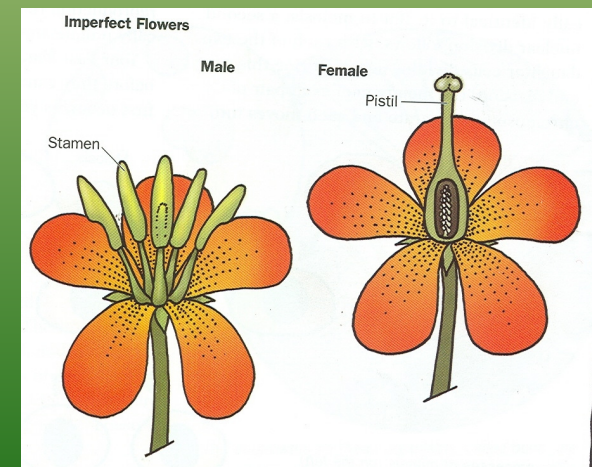
Perfect flower =

- Has male **AND** female reproductive structures



Imperfect flower =

- Has only male **OR** female reproductive structures



Pollination =

- Transfer of pollen from an anther to a stigma
 - Self pollination
 - Same plant
 - Cross pollination
 - Another plant of the same species
- Aided by:
 - Wind
 - Water
 - Animals

Fertilization =

- Union of sperm (male) and egg (female)
- 1 sperm unites with 1 egg in the ovule
- Note:
 - Other sperm and 2 fused nuclei unite to form endosperm
 - Ovary develops into fruit
 - Contains seed(s)

Purpose of flower: (and its petals)

- Attract attention of insects for pollination and fertilization
 - Scents
 - Bright colors

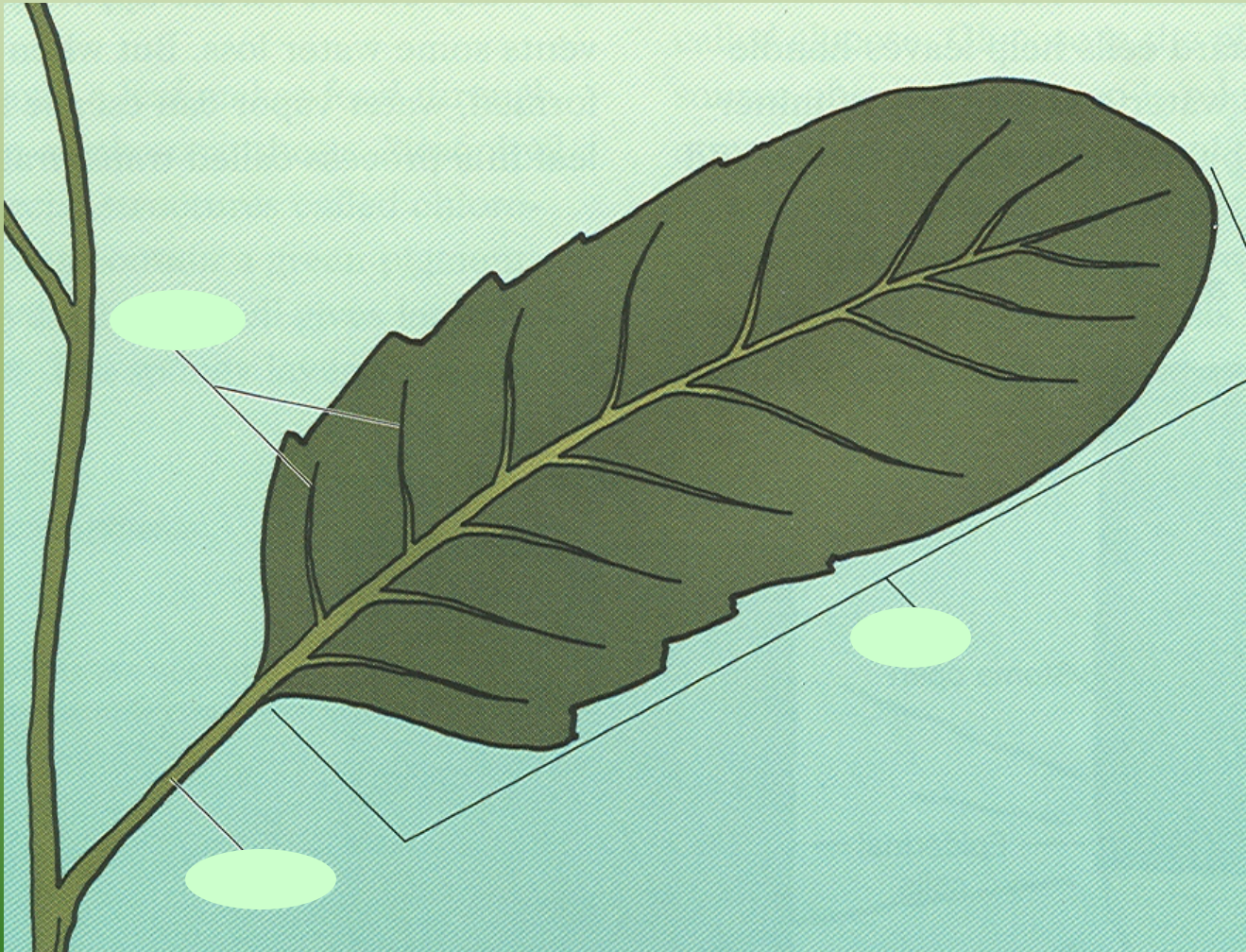
LEAVES

Main job of leaves:

- Make food for the plant

Parts easily seen

- Blade
 - Usually broad and flat
- Petiole
 - Narrow, stem-like part
 - Joins blade to stem or branch
- Veins
 - Carry water and other substances

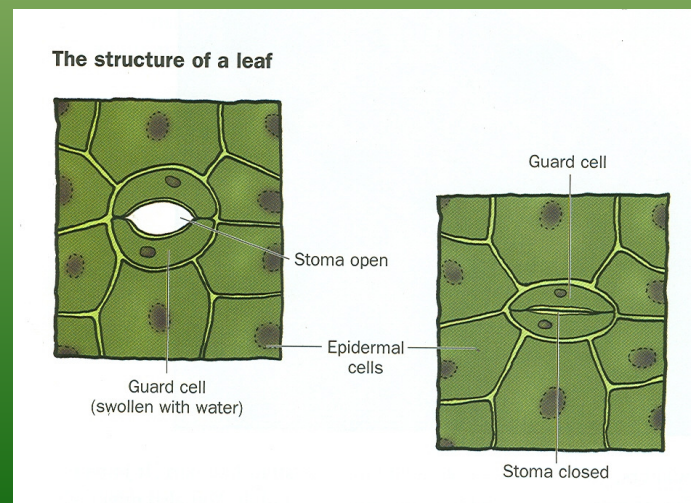


Parts not easily seen

- Epidermis
 - Outer thin, tough layer of cells on both surfaces of the blade
 - “Skin”
 - Secretes waxy film known as cuticle
 - Cuticle covers upper epidermis
 - Protects leaf from losing too much water

- Stomata (singular = stoma)
 - Tiny openings throughout lower epidermis
 - Gas exchange
 - Often open during day and closed at night

- Guard cells
 - Fill with water
 - Swell and develop opening (stoma)
 - Lose water
 - Move back together, closing stoma
 - Thus, help control water loss



Mesophyll

- Between upper and lower epidermis
- Includes
 - Tightly packed palisade cells
 - Spongy layer
 - Provides room for water and gases to travel
- Food made here by photosynthesis
- Contains chloroplasts which contain chlorophyll

